

611-TD-560-001

EOSDIS Core System Project

M&O Procedures: Section 6—Network Administration

Interim Update

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Preface

This document is an interim update to the Mission Operations Procedures Manual for the ECS Project, document number 611-CD-500-001. This document has not been submitted to NASA for approval, and should be considered unofficial.

The document has been updated to include information relevant to ECS Release 5B.

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6. Network Administration

This section covers the procedures necessary for the management operations which monitor and control the system network capabilities.

Detailed procedures for tasks performed by the Network Administrator are provided in the sections that follow. The procedures assume that the administrator is authorized and has proper access privileges to perform the tasks (i.e., root).

The **\$OV_BIN** directory must be in your path. If the **\$OV_BIN** directory is not in your path, then each command referenced must be prefixed with the **\$OV_BIN/** directory path to execute any of the commands specified.

Each procedure outlined will have an **Activity Checklist** table that will provide an overview of the task to be completed. The outline of the **Activity Checklist** is as follows:

Column one - **Order** shows the order in which tasks should be accomplished.

Column two - **Role** lists the Role/Manager/Operator responsible for performing the task.

Column three - **Task** provides a brief explanation of the task.

Column four - **Section** provides the Procedure (P) section number or Instruction (I) section number where details for performing the task can be found.

Column five - **Complete?** is used as a checklist to keep track of which task steps have been completed.

For each procedure outlined in this section, there is a corresponding **QUICK STEP** procedures immediately following on the procedure in this chapter. The **QUICK STEP** procedures are designed for persons who are *experienced administrators with prior network administration experience*.

6.1 HP Open View Network Node Manager (NNM)

HP Open View Network Node Manager (NNM) is a multivendor network management application for use in managing TCP/IP networks and network devices that support the Simple Network Management Protocol (SNMP). NNM is an HP Open View SNMP-based application running under the HP Open View Windows (OVW) graphical user interface.

The NNM product is a configuration, performance, and fault management application for multivendor TCP/IP (Transmission Control Protocol/Internet Protocol) networks. NNM enables you to:

- Automatically discover the devices on the TCP/IP network and monitor the status of those devices.

- Automatically draw the Internet Protocol (IP) topology maps based on discovered information. A map is a graphical and hierarchical representation of your network and its systems. Discovered devices are placed in appropriate segments, networks, or Internet based on the topology of the IP network.
- Manage any vendor devices that support the Simple Network Management Protocol (SNMP). NNM can manage standard Management Information Base (MIB) objects, as well as Enterprise-specific MIB objects.
- Include new Enterprise-specific MIBs into the NNM MIB. Once you have loaded the new MIB module on the management station, you can manage any of the MIB objects defined in that MIB module.

The **Activity Checklist** table that follows provides a basic overview of the NNM functions..

Table 6.1-1. Network Administration - Activity Checklist

Order	Role	Task	Section	Complete ?
1	Net Admin.	Start Network Node Manager	(P) 6.1.1	
2	Net Admin.	Add a Network Object	(P) 6.1.2.1	
3	Net Admin.	Add a Segment Object	(P) 6.1.2.2	
4	Net Admin.	Add a Node Object	(P) 6.1.2.3	
5	Net Admin.	Add an IP Interface Object	(P) 6.1.2.4	
6	Net Admin.	View the Current Network and System Configuration	(P) 6.1.3	
7	Net Admin.	View Network Address Information	(P) 6.1.4	
8	Net Admin.	View How Traffic is Routed on a Network	(P) 6.1.5	
9	Net Admin.	View the Services Available on a Node	(P) 6.1.6	

Detailed procedures for these tasks are provided in the sections that follow.

6.1.1 Starting Network Node Manager (NNM)

HP Open View Network Node Manager is a set of applications that are integrated with HP Open View Windows (OVW). To start NNM, HP OpenView Windows must be activated first. Once activated, OVW will automatically start NNM. HP OpenView windows will also automatically start the applications that are installed and registered.

Prerequisites for this Task

The network management processes that work with OVW and NNM *must be running*. The network management processes consist of the following HP OpenView background processes:

- **ovwdb** - OpenView Object Database daemon
- **trapd** - OpenView Event Specification and Event Configuration
- **ovtopmd** - OpenView IP Topology daemon
- **ovactiond** - OpenView daemon to execute shell commands upon receipt of an event
- **snmpCollect** - Simple Network Management Protocol
- **netmon** - Network Monitor
- Check to see if these processes are running using **/usr/ov/bin/ovstatus** command.

These procedures explain how to start the HP OpenView Windows graphical user interface:

- 1 Type **ovstart** at the command prompt and **press Enter**.
 - If the network management processes are not running, start them by executing the **ovstart** command.
- 2 Type **ovstatus | more** at the command prompt and **press Enter**.
 - This command will check the status of the processes. *If any errors are reported refer to the troubleshooting section of *Using HP Network Mode Manager*.
- 3 Type **ovw** at the command prompt and **press Enter**.
 - This command will start HP OpenView Windows.

To exit NNM and all other integrated applications, you must exit OVW. You can exit OVW in **either** of the following ways:

- 4 Select **File: Exit** from the menu bar of any submap window

- OR -
- 5 **Click** on the **Close** button on all open submap windows until a black submap window is displayed. When the black submap window is displayed, click on the **Close** button.
 - The open map is saved, and all the submap windows and dialog boxes of the map are closed. OVW, all NNM applications, and all other integrated applications are closed.

Table 6.1-2 presents the Quick-Step Procedures to start Network Node Manager.

Table 6.1-2. Starting NNM (Network Node Manager) - Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1	ovstart \$OV_BIN/ovstart if network management processes are not running	press Enter
2	ovstatus	press Enter
3	x11start	press Enter
4	ovw \$OV_BIN/ovw if \$OV_BIN directory is not in the path	press Enter
	<i>To exit Network Node Manager: (2 methods)</i>	
5	Exit	File → Exit
6	Close button on all open submap windows	single-click on Close button

6.1.2 Creating Additional Objects

To complete the distribution of resources over the map to better match how your network is organized, you must first expand the lower levels of the network map by creating additional network, segment, and node objects. The following sections show how to add network, segment, node, and interface objects to the network map so that IP Map will manage them.

6.1.2.1 Adding a Network Object

Prerequisites for this Task

The map must be opened with read-write access. The first instance of opening the map starts up in read-write status as indicated on the lower left of the map window.

1-4 Follow prerequisites steps (1-4 *ONLY*) for Task: *Starting Network Node Manager*

5 Select **Edit: Add object**

6 From the **symbol palette**, choose the desired symbol type for the network object by selecting the desired subclass and use button 2 to drag the symbol to the submap. The **Add object** dialog box appears.

7 Enter a selection name for the object in the **Selection Name** field of the **Add Object** dialog box.

- 8 In the **Object Attributes** list, select **IP Map** and click **Set Object Attributes**. The **IP Map Set Attributes** dialog box for a network object appears.
- 9 Enter a **Network Name**.
- 10 Enter a **Network Address**.
- 11 Optionally, **Network Subnet Mask** can be entered.
- 12 Click **Verify** to check for valid entries.
- 13 Click on **OK** to close the **Set Attributes** dialog box.
- 14 Click on **OK** in the **Add Object** dialog box to complete the operation.

Table 6.1-3 presents the **QUICK STEP** procedures to Add a Network Object.

Table 6.1-3. Adding a Network Object - Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1 - 4	Follow prerequisites steps (1-4 <i>ONLY</i>) for Task: Starting Network Node Manager	press Enter
5	Edit:	select with mouse
6	Select the desired symbol type	select with mouse
7	Selection Name	(No action)
8	Select IP Map	click Set Object Attributes
9	Enter Network Name	press Enter
10	Enter Network Address	press Enter
11	Enter Network Subnet Mask (Optional)	press Enter
12	Select Verify	select with mouse
13	Select OK to close the Set Attributes	select with mouse
14	Select OK in the Add Object	select with mouse

6.1.2.2 Adding a Segment Object

If the segment which the node is on can be identified, IP Map places the segment on that node. If it cannot make the identification, IP Map places the segment on the default segment submap. The default segment submap is the submap created by IP Map when OVW was first started. If that submap has been deleted, the default segment submap becomes the oldest segment submap. IP Map discovers new nodes on segments attached to SNMP, IP addressable bridges and multi-port repeaters (hubs).

Prerequisites for this Task

The map must be opened with read-write access.

- 1-4** Follow prerequisites steps (1-4 *ONLY*) for Task: *Starting Network Node Manager*
- 5** Select **Edit: Add Object**.
- 6** From the **symbol palette**, choose the desired symbol type for the segment object by selecting the desired class, then the desired subclass, and drag the symbol to the submap. The **Add Object** dialog box appears.
- 7** Enter a selection name for the object in the **Selection Name** field of the **Add Object** dialog box.
- 8** In the **Object Attributes** list, select **IP Map** and click **Set Object Attributes**. The **IP Map Set Attributes** dialog box for a segment object appears. A figure of the dialog box follows this procedure.
- 9** Enter a **name for the segment**. It must be unique to other segment names in the submap.
- 10** Click **Verify** to check for valid entries.
- 11** Click on **OK** to close the **Set Attributes** dialog box.
- 12** Click on **OK** in the **Add Object** dialog box to complete the operation.

Table 6.1-4 presents the Quick-Step Procedures to Add a Segment Object to the network map.

Table 6.1-4. Adding a Segment Object- Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1 - 4	Follow prerequisites steps (1-4 <i>ONLY</i>) for Task: <i>Starting Network Node Manager</i>	press Enter
5	Select Edit: Add Object	select with mouse
6	Desired symbol type for the segment object by	select desired class, then the desired subclass, and drag the symbol to the submap
7	Enter Selection Name	press Enter
8	Select IP Map	click on Set Object Attributes
9	Enter a name for the segment (must be unique)	press Enter
10	Select Verify	select with mouse
11	Select OK to close the Set Attributes	select with mouse
12	Select OK in the Add Object dialog box	select with mouse

6.1.2.3 Adding a Node Object

An Object can be added that represents a node or a network device to Segment submap by placing one of the supported symbols on a Segment submap. Double-clicking on the node symbol opens a Node submap. IP Map discovers and manages the symbols that represent the Computer, Connector, and Net Device classes in a Node submap.

Prerequisites for this Task

The map must be opened with read-write access.

1-4 Follow prerequisites steps (1-4 *ONLY*) for Task: *Starting Network Node Manager*

5 Select **Edit: Add Object**

6 From the **symbol palette**, choose the desired symbol type for the node object by selecting the desired class, then the desired subclass, and drag the symbol to the submap. The Add Object dialog box appears.

7 Enter a selection name for the object in the **Selection Name** field of the **Add Object** dialog box.

8 In the **Object Attributes** list, select **IP Map**, and click **Set Object Attributes**. The **IP Map Set Attributes** dialog box for a node object appears.

9 Enter the hostname of the node.

10 Enter the IP address of the node.

11 Click **Verify** to check for valid entries.

12 Click on **OK** to close the **Set Attributes** dialog box.

13 Click on **OK** in the **Add Object** dialog box to complete the operation.

Table 6.1-5 presents the Quick-Step procedures to Add a Node Object to the network map.

Table 6.1-5. Adding a Node Object- Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1 - 4	Follow prerequisites steps (1-4 <i>ONLY</i>) for Task: Starting Network Node Manager	press Enter
5	Select Edit: Add Object	select with mouse
6	Desired symbol type for the segment object	select desired class, then the desired subclass, and drag the symbol to the submap
7	Enter selection name	press Enter
8	Select IP Map	click Set Object Attributes
9	Enter hostname of the node	press Enter
10	Enter the IP address of the node	press Enter
11	Select Verify	select with mouse
12	Select OK to close the Set Attributes	select with mouse
13	Select OK in the Add Object to complete the operation	select with mouse

6.1.2.4 Adding an IP Interface Object

IP interface can be added to a Node submap by placing an IP Interface symbol on a Node submap. This is done by entering the IP address of the interface.

Prerequisites for this Task

The map must be opened with read-write access.

- 1-4** Follow prerequisites steps (1-4 *ONLY*) for Task: **Starting Network Node Manager**
- 5** Select **Edit: Add Object**.
- 6** From the **symbol palette**, select the **IP Interface** symbol in the **Cards** class. The Add Object dialog box appears.
- 7** Enter a **selection name** for the object in the **Selection Name** field of the **Add Object** dialog box.
- 8** In the Object Attributes list, select **IP Map**, and click **Set Object Attributes**. The IP Map Set Attributes dialog box for an IP Interface object appears.
- 9** Enter the **IP Address** for the IP interface. The subnet mask is added for you.
- 10** Click **Verify** to check for valid entries.

- 11 Click on **OK** to close the Set Attributes dialog box.
- 12 Click on **OK** in the Add Object dialog box to complete the operation.

Table 6.1-6 presents the Quick-Step procedure to Add an IP Interface Object to the Network Map.

Table 6.1-6. Adding an IP Interface Object- Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1 - 4	Follow prerequisites steps (1-4 ONLY) for Task: Starting Network Node Manager	press Enter
5	Select Edit: Add Object	select with mouse
6	Select the IP Interface	select with mouse
7	Enter selection name for the object	press Enter
8	Select IP Map	select Set Object Attributes
9	Enter IP Address for the IP interface	press Enter
10	Select Verify	select with mouse
11	Select OK to close the Set Attributes dialog box	select with mouse
12	Select OK in the Add Object dialog box	select with mouse

6.1.3 Viewing the Current Network and System Configuration

NNM provides quick access to information about your network and system configurations. This section points you to the menu items available to accessing this information.

Prerequisites for this Task

One or more nodes must be selected from the map. If you select more than one node, you receive a dialog box for each selected node.

- 1-4 Follow prerequisites steps (1-4 **ONLY**) for Task: **Starting Network Node Manager**
- 5 Select the **object** for which you want a description.
- 6 Select Monitor: **Description - Selected Objects**. The **Object Description** dialog box appears.
- 7 In the **Object Description** dialog box, select **IP Map** and select **View/Modify Object Attributes**. The **Set Attributes** dialog box appears.

Table 6.1-7 presents the **QUICK STEP** procedures to View the Current Network and System Configuration.

Table 6.1-7. Viewing the Current Network and System Configuration - Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1 - 4	Follow prerequisites steps (1-4 ONLY) for Task: Starting Network Node Manager	press Enter
5	Select the object for which you want a description	select with mouse
6	Select Monitor: Description - Selected Object	select with mouse
7	Select IP Map	Select with mouse
8	Select View/Modify Object Attributes	Select with mouse

6.1.4 Viewing Network Address Information

This task is useful for determining the addresses associated with a node, without looking through configuration files. The information you see is real-time data taken from the node versus static information taken from a database.

Prerequisites for this Task

- The node must support SNMP.
- One or more SNMP nodes must be selected from the map. If you select more than one node, you receive a dialog box for each selected node.

1-4 Follow prerequisites steps (1-4 **ONLY**) for Task: **Starting Network Node Manager**

5 Select a **node** on the map.

6 Use the **Monitor: Network Configuration - Addresses....** Operation to view the following information about each interface on the node:

- interface index
- interface name
- IP address
- network mask
- network address
- link-level address (physical address)

For example:

Index	Interface	IP address	Network Mask	Network Address	Link Address
4	lan1	126.1.0.2	255.255.0.0	126.1.0.0	0x01002033333
3	lan0	126.1.0.3	255.255.0.0	126.1.0.0	0x01000202222
2	lo0	222.0.0.1	255.0.0.0	222.0.0.0	<none>

Table 6.1-8 presents the **QUICK STEP** procedures to view network address information.

**Table 6.1-8. Viewing Network Address Information-
Quick-Step Procedures**

Step	What to Enter or Select	Action to Take
1 - 4	Follow prerequisites steps (1-4 ONLY) for Task: Starting Network Node Manager	press Enter
5	Select a node on the map	select with mouse
6	Use the Monitor: Network Configuration - Addresses	select with mouse

6.1.5 Viewing How Traffic is Routed on a Network

This task lists the routing table information for a remote SNMP node. It can be useful in determining more efficient routes on the network, assessing the need for explicit routes and diagnosing connectivity problems. The information you see is real-time data taken from the node versus static information taken from a database.

When rerouting traffic on the network, there are two ways of performing the task:

- For temporary change, the command route command is used.
- For permanent change, netlinkrc needs to be edited and the system needs to be rebooted.

Prerequisites for this Task

- The node must support SNMP.
- One or more SNMP node must be selected from the map. If you select more than one node, you receive a dialog box for each selected node.

1-4 Follow prerequisites steps (1-4 **ONLY**) for Task: **Starting Network Node Manager**

5 Select a **node** on the map.

6 Use the **Monitor: Network Configuration - Routing Table..** operation to view the following information about each destination node with which the selected node communications:

- destination name (default is a route that the system uses when it cannot find a specific route)
- name of the gateway (router) between the selected node and the destination
- type of route (for example, directly connected to a LAN, through a remote gateway, or route currently not available)
- network subnet mask associated with the route
- name of the interface that is used to reach the destination

Table 6.1-9 presents the Quick-Step procedure for Viewing Traffic.

Table 6.1-9. Viewing How Traffic is Routed on a Network-Quick-Step Procedures

Step	What to Enter or Select	Action to Take
1 - 4	Follow prerequisites steps (1-4 <i>ONLY</i>) for Task: Starting Network Node Manager	press Enter
5	Select a node on the map	select with mouse
6	Select Monitor: Network Configuration - Routing Table	select with mouse

6.1.6 Viewing the Services Available on a Node

This task lists the IP networking services for which a remote SNMP node is listening. It is useful for determining what configured services a node is currently running. The information you see is real-time data taken from the node versus static information taken from the database.

Prerequisites for this Task

- The node must support SNMP.
- One or more SNMP nodes must be selected from the map. If you select more than one node, you receive a dialog box for each selected node.

1-4 Follow prerequisites steps (1-4 *ONLY*) for Task: **Starting Network Node Manager**

5 Select a **node** on the map.

6 Use the **Monitor: Network Configuration - Services..** operation, to view the following information about the selected node:

- service protocol: either TCP (Transmission Control Protocol) or UDP (User Datagram Protocol).
- Port to which the service is bound.
- Service for which the node is listening (for example, telnet, nfs). If no service is listed, the service is either unavailable or unknown.

Table 6.1-10 presents the Quick-Step procedures to View Available Services on a node.

**Table 6.1-10. Viewing the Services Available on a Node-
Quick-Step Procedures**

Step	What to Enter or Select	Action to Take
1 - 4	Follow prerequisites steps (1-4 <i>ONLY</i>) for Task: Starting Network Node Manager	press Enter
5	Select a node on the map	select with mouse
6	Select Monitor: Network Configuration - Services	select with mouse

6.2 Diagnosing Network Problems

A fault within network is defined as something that causes those systems “to fail to meet their operational objectives.” Three elements are involved in managing network faults: detection of the fault, isolation of the fault to a particular component, and correction of the fault. Fault management, therefore, may include the maintenance of error logs, error detection processes, and diagnostic testing procedures. For many managers, the term network management is synonymous with fault management.

Performance and fault management are difficult to separate. High performance usually implies a low incident of faults. Performance management, however, goes beyond minimizing faults; it is responsible for gathering statistics on the operation of the network, maintaining and analyzing logs of the state of the system, and optimizing network operation.

Sniffer Network Analyzer: Ethernet Monitor is used to make sure the network is working at its peak performance and will diagnose any possible fault within the network. The Ethernet Monitor is a network monitoring program. The monitor provides an accurate picture of network activity at any moment or a historical record on network activity over a period of time. This information helps you find traffic overloads, plan for network expansion, detect intruders, establish performance baselines, and distribute traffic more efficiently among servers and subnets.

The monitor’s report capabilities let you communicate this information to others, complete with graphs and tables. The alarm capabilities alert you to problems with the network or with individual stations.

This list summarizes the monitor’s capabilities:

- Monitors up to 1,024 network stations
- Generates visible and audible alarms for the entire network or for individual stations
- Compiles a historical alarm log
- Provides real-time traffic and historical information for individual stations and for the entire network

- Sorts statistics to show only the items that interest you
- Creates customized management reports
- Automatically prints selected information at set time intervals

Note: The Ethernet Monitor only monitors frames on the Ethernet network segment to which the Network Interface Card is attached.